

Safety Evaluation by the DOE Regulatory Unit (RU)
of Proposed Authorization Basis Amendment Request
ABAR-W375-99-00015,
to the Safety Requirements Document, Volume II
for the River Protection Project Waste Treatment Plant

“Changes to Safety Requirements Document, Volume II, Appendix A with regard to Integrated Safety Management Team Makeup & Roles and Documentation of Control Strategy Selection,”
Revision 1, dated April 1, 2000

(Contract DE-AC27-96RL13308)

1. INTRODUCTION

The River Protection Project Waste Treatment Plant (RPP-WTP), formerly the Tank Waste Remediation System-Privatization (TWRS-P), that will vitrify radioactive waste at the Hanford Site is described in the above referenced contract. The Authorization Basis (AB) for RPP-WTP requires the contractor, BNFL Inc., to maintain a Safety Requirements Document (SRD). The SRD defines the standards used by the contractor to design, construct, and operate the facility. The standards are directed toward control of radiological, nuclear, and process hazards such that adequate protection is provided to workers, the public, and the environment. The contractor submitted Revision 1 to a proposed amendment to Appendix A of SRD Volume II via BNFL letter from A. J. Dobson to D. C. Gibbs, RU, “Contract Number DE-AC06-96RL13308-W375 – Transmittal of Authorization Basis Amendment Request (ABAR) ABAR W-375-00-00015,” 00-RU-0322/CCN 012668, dated April 12, 2000.

The proposed SRD amendment would modify the description of the process of selecting Work Activity Experts (WAE) and state that the Process Management Team (PMT) is the safety requirements and standards identification process management team cited in DOE/RL-96-0004, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for the RPP Waste Treatment Plant Contractor..* The amendment would also state that integrated teams perform work identification, hazard evaluation, control strategy development and standards identification steps of DOE/RL-96-0004. Finally, the amendment would eliminate the requirement that there be a narrative defining the overall approach to control each specific pre-identified hazard in instances where self-evident or proven control strategies are selected.

2. BACKGROUND

There are seven groups of proposed changes to SRD Volume II in this ABAR. They are discussed in this section in the order in which they are presented in the ABAR.

- a. **“Note that the project refers to the process for establishing a set of radiological, nuclear and process safety requirements and standards as “Integrated Safety Management” (ISM).**

Revision 2e of the SRD Volume II, Appendix A, Section 1 states:

“This standard implements the process for establishing a set of radiological, nuclear, and process safety requirements and standards as described in DOE/RL-96-0004 and RL/REG-98-17...

The Safety Requirement Document (SRD) provides formal documentation of the result of this process. The SRD is updated as required to reflect the results of successive iterations of the standards requirements and identification process.”

In the proposed revision to the SRD, this language is replaced with:

“This standard implements the process for establishing a set of radiological, nuclear, and process safety requirements and standards as described in DOE/RL-96-0004 and RL/REG-98-17. BNFL Inc. refers to this process as Integrated Safety Management (ISM)....

The Safety Requirements Document (SRD) provides formal documentation of the standards, which are a result of this process. The SRD is updated as required to reflect the results of successive iterations of the standards and requirements identification process (i.e., the ISM process).”

- b. **“Clarify the description of the process of selecting Work Activity Experts, which ensures that the most qualified personnel on the RPP-WTP project participate in this role. Generalize participation of technical staff of the Project Design Managers.”**

Revision 2e of the SRD Volume II, Appendix A, Sections 3.0, 4.0, 5.0, and 7.0 state:

“Work Activity Experts shall be drawn from the following TWRS-P organizations:

- Functional staff of the TWRS-P Engineering Manager;
- technical staff of the HLW and LAW Vitrification Project Design Managers; and
- technical staff of the BOF and Pretreatment Project Design Managers

The process management team shall oversee the Identification of Work Activity and provide additional technical resources as necessary.”

In the proposed revision to the SRD, this language is deleted in Sections 3.0, 4.0, 5.0 and replaced with:

“Work activity experts shall be drawn from the following TWRS-P organizations:

- Technical staff of the Project Design Manager(s); and
- Operations staff

When appropriate, the Process Management Team may also draw Work Activity Experts from the staff of the Functional Engineering Manager.”

However, in Section 7.0, the replacement language omits mention of Operations staff. It

is assumed that this is a typographical error and will be corrected in the revised Appendix to the SRD.

In its evaluation of this revision, BNFL states:

“The purpose of this change is to ensure that the most knowledgeable project personnel are involved in the ISM process. Consequently, the change enhances safety. There are no applicable laws or regulations regarding personnel requirements for ISM. This change conforms with top-level principles 4.1.2, Safety Responsibility; and, 5.2, Process Safety Management Program.”

- c. **“Clarify that the safety requirements and standards identification process management team is the Process Management Team (PMT). Provide the current project title for the safety requirements and standards Process Manager. Define makeup of PMT by project organization, rather than by specific position title, and clarify that project implementing documents provide the specific constitution of the PMT.”**

Revision 2e of the SRD Volume II, Appendix A, Sections 2.0, Process Initiation states:

“The DOE/RL-96-0004 safety requirements and standards identification process manager for the TWRS-P project is the Safety and Regulatory Programs Manager. The DOE/RL-96-0004 safety requirements and standards identification process management team shall consist of the following TWRS-P personnel:

- Safety and Regulatory Programs Manager;
- Safety Process Manager;
- Design Safety Implementation Manager;
- HLW and LAW Vitrification Project Design Managers; and
- BOF and Pretreatment Project Design Managers.”

In the proposed revision to the SRD, this language in Section 2.0 is replaced with:

“The DOE/RL-96-0004 safety requirements and standards identification Process Manager for the project is the Manager, Radiological, Nuclear, and Process Safety.

The Process Manager chairs the DOE/RL-96-0004 safety requirements and standards identification Process Management Team (PMT). The PMT is constituted in accordance with project implementing documents and includes managers from the following project organizations:

- Environmental, Safety, & Health;
- Functional Engineering;
- Operations; and
- Area Project Design

The Process Management Team (PMT) shall oversee the ISM process and shall provide

resources and resolve issues as necessary. The PMT shall set up Integrated Teams for the conduct of ISM on a plant system basis. Individual PMT members shall provide various subject matter experts to help fulfill the roles required of the Integrated Teams for conduct of the ISM process.”

In its Evaluation of this revision, BNFL states:

“This change clarifies the role and makeup of the Process Management Team (PMT) in the ISM process. Defining the makeup of the PMT by project organization, rather than by specific position title, and clarifying that project implementing documents provide the specific constitution of the PMT broadens the makeup of the PMT, while providing flexibility in specific team membership. For information, the current makeup of the PMT follows:

Manager, Radiological, Nuclear, and Process Safety (formerly Safety and Regulatory Programs Manager);

- *Safety Process Manager;*
- *Design Safety Implementation Manager;*
- *HLW and LAW Vitrification Project Design Managers;*
- *BOF and Pretreatment Project Design Manager;*
- *Functional Engineering Manager; and*
- *Operational Safety Manager*

Adding the Functional Engineering Manager, and Operational Safety Manager to the PMT provides additional expertise and helps to minimize resource conflicts; consequently, the change enhances safety. Inclusion of the Project Design Managers without their facility assignment provides flexibility in the event that future design changes result in organizational changes affecting Project Design Managers. This latter change maintains adequate safety, since there is no actual change to the makeup of the PMT. There are no applicable laws or regulations regarding personnel requirements for ISM. There is no requirement within DOE/RL-96-0004 or DOE/RL-96-0006 that the SRD must identify the specific composition of the PMT. This change conforms with the Top-Level Principles 4.1.2, Safety Responsibility, and 5.2, Process Safety Management Program.”

d. “Clarify that the integrated teams perform work identification, hazard evaluation, control strategy development, and standards identification.”

Previously, ISM meetings involving identification of work, hazard assessment, hazard control, and Environmental Safety and Health, (ESH) might have been viewed as activities to be performed by separate teams of experts (WAE, HAE, HCE, ESE, in the nomenclature of DOE/RL-96-0004).

In the proposed revision to the SRD, language is added at the end of Section 2.0, Process Initiation:

"The Process Management Team (PMT) shall oversee the ISM process and shall provide resources and resolve issues as necessary. The PMT shall set up Integrated Teams for the conduct of ISM on a plant system basis. Individual PMT members shall provide various subject matter experts to help fulfill the roles required of the Integrated Teams for conduct of the ISM process."

In its Evaluation of this revision, BNFL states:

"Integrated teams perform all steps of ISM on a given system, as opposed to having separate teams perform the different steps. This change enhances integration by ensuring consistency and minimizes the potential for "hand-off" errors from one team to another. Furthermore, individual PMT members will provide subject matter experts as necessary to augment the integrated teams. Therefore, the change enhances safety. There are no applicable laws or regulations regarding personnel requirements for ISM. This change conforms with top-level principles 4.1.2, Safety Responsibility, and 5.2, Process Safety Management Program."

- e. **"Clarify that documentation of the linkage of control strategy to respective hazards will be contained in the hazard database. Clarify the requirement to provide a defensible rationale for selection of all preferred control strategies to note that, when the appropriate strategy is self-evident or when a proven control strategy exists that is appropriate to the hazard, the rationale need only state that fact and not provide a discussion of other, obviously inappropriate, alternatives. In other cases, a formal evaluation of potential alternative control strategies is required, along with the defensible rationale for selection of the preferred strategy. In conjunction with this portion of the SRD revision, an editorial correction is being made to Appendix , A Section 9.0, Formal Documentation, to clarify that it is the results of the standards selection process, not a description of the process, that is to be documented following confirmation by the Project Safety Committee (PSC)."**

Revision 2e of the SRD Volume II, Appendix A, Sections 5.0, Development of Control Strategies states:

"Documentation of the hazard control strategy development process shall be a narrative defining the overall approach to control a specific pre identified hazard. The control strategy should be described in terms of the safety functions required (e.g., limit release of radionuclides, etc.) and in terms of a set of engineered features, administrative controls (procedures and training), and management systems selected for implementing the strategy. The documentation should identify all control strategies considered and provide a defensible rationale for selection of the preferred strategy. The following information produced by the control strategy definition shall be recorded in the hazard database:

- Preferred control strategy;
- rationale for preferred control strategy selection;
- defense in depth provided;
- control strategy functions and performance requirements;
- estimate of the unmitigated event frequency;

- estimate of the consequences from the mitigated event;
- estimate of the mitigated event frequency; and
- applicable Design Basis Events (DBEs) (e.g., design basis earthquake)

The information in the hazard database links the specific hazards to specific control strategies."

In the proposed revision to the SRD, this language in Section 5.0 is replaced with:

"Documentation of the hazard control strategy development process shall clearly indicate selection of the control strategies and show the linkage of the control strategies to the respective hazards. The control strategy should be described in terms of the safety functions required (e.g., limit release of radionuclides, etc.) and in terms of a set of engineered features, administrative controls (procedures and training), and management systems selected for implementing the strategy. When the nature of the hazard is such that the appropriate control strategy is self-evident, the documentation need only demonstrate that the control strategy meets most, if not all, of the selection criteria and need not provide a discussion of other, non-applicable control strategies. Similarly, where a proven control strategy that is appropriate to the hazard exists and it is obvious to the team that there are no other alternative control strategies that could be equally attractive, then the documentation need only demonstrate that the control strategy meets most, if not all, of the selection criteria. Otherwise, the documentation should identify all control strategies considered and provide a defensible rationale for selection of the preferred strategy. The following information produced by the control strategy definition shall be recorded in the hazard database:

- Preferred control strategy;
- linkage of the control strategy to the respective hazards;
- rationale for preferred control strategy selection;
- defense in depth provided;
- control strategy functions and performance requirements;
- estimate of the unmitigated event frequency;
- estimate of the consequences from the mitigated event;
- estimate of the mitigated event frequency; and
- applicable design basis events (e.g., design basis earthquake)"

In its Evaluation of this revision, BNFL states:

"The change requires that documentation of the hazard control strategy development process clearly indicate selection of the control strategies and show the linkage of the control strategies to the respective hazards. That linkage is documented in the Safety Implementation Process Database (SIPD), which is the title of the project hazard database.

With regard to the requirement to provide a defensible rationale for the selection of the control strategy, the integrated teams, which include suitably qualified staff from safety, operations and engineering disciplines, ensure, during the development process, that the

control strategies selected are appropriate for their respective hazards. In many cases the correct control strategy is self-evident. For example, to control the hazard due to direct radiation exposure to radioactive feed material, the correct control strategy is to place the material in shielded tanks. It would be a misuse of resources to consider alternatives to this proven solution. Similarly, a proven control strategy may exist that is appropriate to the hazard under consideration. If no other alternative control strategies are identified that appear to be equally attractive, then it should not be necessary to provide a detailed discussion of alternatives in documenting the selection of the control strategy. This approach is consistent with top-level principles 4.1, Overall Principles, subsection 4.1.6.2, Established Techniques and Procedures, and 4.2, Design, Construction, and Pre-Operational Testing, subsection 4.2.2.1 Proven Engineering Practices, which indicate a strong regulatory preference for the use of proven technologies and design features.

In the remainder of cases where the correct control strategy cannot be selected by application of informed judgment of the integrated team, it is necessary to carry out and document the control strategy selection process. An example of this is selection of an active and/or passive strategy to control hazards associated with hydrogen accumulation. (Typically, a full discussion of alternative control strategies will be provided for those hazards covered by Topical Meetings.)

There are no applicable laws or regulations regarding documentation requirements for ISM. In conformance with top-level principle 5.2, process Safety Management Program – particularly subsection 5.2.2, Process Hazard Analysis, BNFL Inc., will document the results of the hazards analysis including process hazards and possible safety and health effects and will submit the results of the hazards analysis to the Director of the Regulatory Unit for evaluation and in support of authorization decisions and regulatory oversight

The current wording of the SRD Appendix A section 9.0, Formal Documentation, implies that a description of the standards selection process is to be documented following confirmation by the Project Safety Committee (PSC). An editorial correction has been made to clarify that it is the results of that process that will be so documented (the process itself is already described in SRD Appendix A). This correction is consistent with Table 1 of DOE/RL-96-0004.”

f. “Clarify that the definitions of “Safety Design Class” and “Safety Design Significant” are located in SRD Safety Criterion 1.0-8.”

This is an editorial change to Section 6.0 of SRD Volume II Appendix A that simply cross-references the terms to the Safety Criterion in which they are defined.

g. “Editorial changes related to cross-references to SRD chapters and safety criteria.”

These editorial changes simply replace references to “Sections” with references to “Chapters” in the SRD.

3. EVALUATION

In the same order as that discussed in Section 2., above:

- a. The proposed change equating “Integrated Safety Management” to the DOE/RL-96-0004 process is acceptable.
- b. The proposed change to the SRD relating to the selection of work activity experts is acceptable, assuming that Work Activity Expert selection will be described in Section 7.0 as it is in Sections 3.0 – 5.0, for consistency. The Regulatory Unit concurs with BNFL’s evaluation of this item, as quoted above. Adding Operations staff to the Work Activity Expert’s diversifies and strengthens the team and is consistent with the Contract objective of integrated safety.

The change to the SRD that replaces explicit statements requiring PMT oversight of the:

- Identification of Work Activity (page A-2);
- the hazard evaluation activity (page A-3);
- the development of control strategies activity (page A-9); and
- the identification of standards activity (page A-13)

with the sentence on page A-1a that states: “The Process Management Team (PMT) shall oversee the ISM Process...” is acceptable. Because BNFL refers to the “ISM process” as the process for establishing requirements and standards as described in DOE/RL-96-0004 and RL/REG-98-17, oversight of each step of the DOE/RL-96-0004 process by the PMT is implied.

- c. The proposed change to the SRD related to the composition of the PMT is acceptable. The organizational composition of the PMT is now adequately described in the SRD.
- d. The proposed change to the SRD related to the functions of the integrated teams is acceptable. Previously, activity X or activity Y might have been viewed as being performed by separate teams. If the integrated teams perform all steps of ISM on a given system, the multidisciplinary integration, consistency, and tailoring that is sought in the standards selection process (DOE/RL-96-0004 and DOE/RL-98-17) can be achieved, and a coherent logic for the selection of standards can be better articulated. The revision enhances safety by ensuring that selected standards support the functional requirements of the control strategies to control individual and grouped hazards.
- e. The proposed change to the SRD is acceptable. By clarifying that the linkage of control strategies to respective hazards will be contained in the hazard database, BNFL provides necessary documentation that each hazard in the facility is associated with an unambiguous control which, in turn, can be judged for adequacy.

BNFL’s proposal that some control strategies are “self-evident,” and therefore do not require consideration of alternative strategies, is acceptable. The documentation must demonstrate, “the control strategy meets most, if not all, of the selection criteria,” as

discussed on page A-10. There is no requirement to provide a discussion of alternative strategies. However, the documentation must clearly explain how safety performance requirements are met for each control strategy, whether it is self-evident or not. In instances where BNFL finds the strategy selection to be “self-evident” the documentation should so indicate. Also, if a “proven control strategy” is selected, it should be so indicated in the documentation and a brief explanation should be provided of why the application was similar enough¹ to RPP-WTP to warrant the conclusion that it is “proven.”

In BNFL’s Safety Evaluation (Part II, Regulatory Impact of Proposed AB Revision), it is stated, *“Experience gained through the application of the ISM process has shown that the requirement to provide a narrative description for control strategies developed for each hazard would result in an excessive commitment of resources.”* This statement does not alter the importance of clear documentation of control strategy logic and performance requirements for design basis events. While there are thousands of individual hazards in RPP-WTP, there are expected to be a limited number of Design Basis Events that establish requirements for control strategies. Each of these strategies should be explained in sufficient detail that their rationale and basis is clear to the reviewer, whether or not they are self-evident, or arise from proven practice. This is not an “excessive commitment of resources” since it is central to defining the safety basis for the facility.

In BNFL’s “Regulatory Impact of Proposed AB Revision,” it is stated that the revision does result in a reduction in commitment currently described in the AB. However, in the Safety Evaluation Worksheet, Item 5 concludes that there is not a reduction in commitment. The RU finds that the change does not reduce a commitment in the SRD, since there was never a requirement to describe alternative control strategies for each hazard but there has always been, and still is, a requirement “to always provide a defensible strategy for the preferred control strategy².” The submittal was inconsistent in this regard.

f. The proposed changes to the SRD are acceptable, since they are purely editorial.

g. The proposed changes to the SRD are acceptable, since they are purely editorial.

4. CONCLUSION

On the basis of considerations described above, the Regulatory Unit has concluded that there is reasonable assurance that the health and safety of the public and the workers will not be adversely affected by this proposed amendment. The proposed amendment complies with applicable laws, regulations, and requirements, and it is in conformance with DOE-stipulated safety standards and principles. Accordingly, this review concludes that the proposed amendment would not adversely affect the objectives of the RPP-WTP authorization basis in terms of the criteria delineated above.

¹ For example, did the control strategy operate under similar environmental conditions (temperature, pressure, chemical environment, etc.)?

² Page 2 of 3, Part II, Regulatory Impact of Proposed AB Revision, item 2.